Return on Experience from Sustainability Audits in European Engineering Educational Institutions

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INTRODUCTION

In Europe, various initiatives have recently proposed specific sustainability dimensions and criteria for the evaluation of universities or graduate schools. Today, sustainability efforts of Higher Educational Institutions (HEIs) in engineering have a strong impact on their accountability, image, and continuous improvements. The purpose of this paper is to present and analyze the experience derived from the use of an evaluation system specifically focused on sustainability and social responsibility (S&SR) performance of HEIs. This system is based on the results of the Erasmus LLP European QUESTE project [1], together with its model and referential, which is aimed at institutional units (department) that are responsible of one or more engineering programs.

After a brief overview of some ongoing international accreditation systems focussed on S&SR concerns in HEIs (in Section 1), the proposed analysis discusses the results of three audits which were conducted in 2012, one in a French engineering HEI, and two others in different European technical universities. As described in Section 2, these audits explored several dimensions, linked to criteria, in order to determine whether the QUESTE-SI label (ranging from strategy to research and education dimensions) could be granted.

After presenting feedbacks from an auditor (in Section 3) and from an audited institution (in Section 4), Section 5 summarises quantitative and qualitative results and shows that the audit preparation and reporting permit an institutional unit to engage in an internal reflection that should contribute to coherently enhance its

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research & educational missions and strategies, so as to favour a national and international recognition of its politics and involvement in the area of S&SR.

1 SUSTAINABILITY EVALUATION SYSTEMS FOR HIGHER EDUCATIONAL INSTITUTIONS

Various initiatives have recently proposed S&SR criteria and indicators for HEIs. As of today, there are more than a dozen of sustainability referentials throughout the world applicable for purposes of HEIs certification or performance measurement. On the one hand, early in 2006, the Sustainability Tracking, Assessment & Rating System (STARS™) was developed by AASHE with a broad participation from the higher education community. In 2007, the Cardiff sustainability tool for curricula (STAUNCH^{RTM}) was developed so as to systematically assess how and to what extent a university curricula contributes to education for sustainable development. Since 2011, LiFE is developed and delivered by the EAUC and Staffordshire University. These systems and tools are fully in the scope of an S&SR perspective and help HEIs to manage, measure, and improve their performance in this respect. From an other perspective, based on a systemic educational approach, the Conceive-Design-Implement-Operate (CDIO) initiative updated a few years ago its engineering syllabus [2], since its teaching methodologies and educational framework inherently support adaptability and facilitate the introduction of S&SR developments in engineering education [3]. On the other hand, external ranking systems permit to compare results and promote efforts such as campus sustainability and environment friendly university management, as found in the GreenMetric Ranking of World Universities (since 2010). S&SR HEIs rankings, in mainstream or specialized national and international press, have now a strong impact on HEI images and incoming student attractiveness.

Several evaluation systems may cohabit with those of incontrovertible accreditation bodies, but referentials are the corner stone to start with. Published in 2010, the ISO 26000 guidelines [4] have become the international standards for all sustainable development initiatives of companies and organizations. These guidelines cover core issues such as governance, human rights, relationships and working conditions, environment, fair operating practices, consumer issues, or community involvement. As required [5] and proposed in business-related education (e.g. Principles for Responsible Management Education, EFMD-EQUIS [6]), research, governance and institutional strategy dimensions also allow HEIs to comply gradually with S&SR requirements. For this reason, in following the ISO guidelines aimed at all types of organizations, some HEI accreditation or quality assurance systems for engineering education have also begun to consider 26000 objectives and criteria. Despite their heaviness and inertia, formal evaluations have a determining effect on institutional policies and continuous improvement of HEIs.

Evaluation systems considering the S&SR reporting of HEIs [7] can be categorized, on one axis, by internal versus external evaluators and, on the other axis, by quality assurance versus accountability objectives [8]. Broadly speaking, based on a S&SR referential, an evaluation process can classically rely on some of the following steps: (i) self-assessment reporting, (ii) auditing-checking, (iii) labelling or awarding, (iv) ranking, (v) continuously improving. However, not all evaluation systems do so. As an example, validated in France by the accreditation bodies and Ministry of sustainable development, for the S&SR evaluation of the two types of French HEIs (which are the *Grandes Ecoles* (i.e. selective top French higher engineering and business schools) and the Universities), the *Plan Vert* [9] does not yet formally award

a label or promote a ranking. At the European level, to measure S&SR performance, the QUESTE-SI project proposes to rate dimensions and progress in terms of objectives and indicators which permits to compare several institutional units, rather than ranking them.

2 THE QUESTE-SI EVALUATION SYSTEM

The QUESTE-SI EU project [1] was initiated in 2010 to promote sustainable education and social responsibility [10] in the field of technical and engineering education, and has come to its end at the beginning of 2013. The project was led by the European Foundation for Management Development (EFMD) and also coordinated by the European Network for Quality of Higher Engineering Education for Industry (ENQHEEI). With the participation of the European Foundation for Engineering Education Development (EFEED), associations (e.g. EUROCADRES, CEFI), and more than a dozen of academic partners across Europe, it defined (i) a model structured by a set of dimensions and quality criteria to evaluate HEI achievements in S&SR, complemented with (ii) an evaluation methodology usable for internal and external progress reporting and scoring. Last but not least, under the responsibility of a Nordic partner university in QUESTE-SI, a group of pilot institutions was created in 2013 and will do its best to promote the label after the project.

Inspired by the ISO guidelines [4], the QUESTE-SI referential covers four dimensions: (D1) institution policy and strategy, (D2) social responsibility & sustainable engineering education (SRSE) and curriculum, (D3) student involvement & cultural development in SRSE, and (D4) research & innovation. Each dimension is attached to a list of criteria and is given a rating (0 to 4 scale, with 0 being used when a dimension cannot be evaluated) as it is intended to reflect the level of quality and maturity reached on a continuous improvement basis. The QUESTE-SI award is conferred by a body in light of a self-assessment report (SAR) (cf. Section 3, delivered by the institutional unit) and a visit report and recommendations (cf. Section 4, developed by the audit team). The SAR comprises three parts: (1) questions that require a brief and well-focused narrative response, (2) an institutional inventory, and (3) a rating of progress in terms of objectives and indicators. Parts 1 and 2 of the SAR are limited to approximately eight pages; part 3 requires filling a dozen objectives per dimension in a tabular sheet, associated with elements of proofs (e.g. internal documents, WebPages, publications, etc.). During the project, eleven European institutions have acted as pilot unit for evaluation, filled one SAR (or more for universities willing to evaluate several units), and accepted audit visits.

3 AN AUDITOR RETURN ON EXPERIENCES

A panel of auditors was created for the QUESTE-SI project. It was composed of former auditors for HEIs or engineering programme managers, and included representatives of the industry. Its members were provided with specific evaluation kits, and trained to audit educational institutions and provide advice and guidance during the evaluation process. The auditor return on experiences presented in this section is based on SAR analysis and audit visits of two different European universities, i.e. one institute of environmental engineering and one faculty of computer science and management, both distinct from the institution referred to in Section 4.

3.1 Self Assessment Report

Based on the SAR analysis, in both reports, the four dimensions of the referential were not overlapping but related, a proof of its adequate structure. The requested information for each of the criteria was sufficiently detailed but not too analytic. The auditor was not overwhelmed with an unstructured amount of data. For evaluation purposes, the referential seemed flexible and suitable to any higher education model and any size of institutional units. Thanks to the previous training and referential appropriation, it took the auditor approximately one day to analyse a SAR.

3.2 Audit visit

Each audit visit took place during one day and a half, plus a few hours for the preparatory meeting of the audit team (three members, including a reporter). The SARs were received one month earlier. A good preparation from the auditors and especially the audit reporter is compulsory. Some exchanges were engaged between the reporter and the institution before the audit visit so as to clarify some objectives or indicators. In both experiences, the capacity of the institutional unit to achieve proper and clear SAR and manage the audit agenda turned out to reflect the institution's maturity which may indicate how sustainability and responsibility are actually considered, for each dimension. The visit time frame was long enough for a fair evaluation. This allows a very detailed factor analysis in the case of good SAR dimension performance, or some kind of support to institutions in order to identify and clarify progress points under low performance.

4 AN AUDITED INSTITUTION RETURN ON EXPERIENCES

Telecom Bretagne is a medium size research center and HEI in ICT, nationally ranked 15+ and member of the public French *Grandes Ecoles* and Mines-Telecom Institute. As a complement to its French CTI engineering accreditation and *Plan Vert* reporting, the institution has decided to join the QUESTE-SI pioneer institutions pool to test the label and strengthen its internal continuous educational improvement loop (initiated via an educational framework [11]). As many French leading "higher schools" [12], the institution takes into account sustainable development policy and social responsibility. The QUESTE-SI evaluation at Telecom Bretagne was supervised by two members as quality referents: (i) the representative for sustainable development (part-time position since 5 years) and project manager of humanities and social sciences, and (ii) an associate professor, dean proxy for accreditations and educational quality assurance issues, as well as French CDIO representative.

4.1 Self Assessment Report

First, the referential had to be appropriated before the archaeology phase (i.e. collection of documents, results and initiatives in the topic all around the institution). Then, elements of significant interests had to be identified and selected to be part of the SAR. More than 60 collaborators were solicited and sometimes called again, such as directors and deans, managers, researchers, professors and faculty. After three months, it was possible to deliver a SAR on the project collaborative platform, and rate objectives and progress thanks to indicators which provided criteria in the evaluation kit for institutions. The auditors noted that the self-rating presented by the institution in the SAR proved to be very modest.

4.2 Audit visit

For the Telecom Bretagne two days audit visit, approximately 40 participants have been involved (for 300 full time employees and 1200 students). Management, staff and students have played the game during the audit visit, and engagement and

motivation were in place… for this round. As expressed by the auditors, fairness and sincerity were felt. However, it was complicated, in such a short time frame, to organize the venue and ensure availability of all the dimension stakeholders (e.g. students, alumni, industrial partners, professors & researchers, directors and managerial staff, etc.), even with videoconferencing. Directors and deans have tight agenda. The auditors regretted not to meet business recruiters or senior alumni during the visit, from which quality referents could only collect support letters. The number of talks was too large in the agenda, limiting clarification and discussion. The visit also enabled managers to learn a lot about their own institution initiatives, quality referents to collect slides and complement proof elements, so as to grasp at which level of commitment the institution was.

4.3 Awarding

Two month after the visit, the eight pages audit report was received and a member participated to the award ceremony. Telecom Bretagne has received the QUESTE-SI label with a score of 3 out of 4 for each of the four dimensions, a proof of its involvement and integrated approach in its engineering programme [14]. Level 3, as defined by the label, corresponds to an institution unit which demonstrates a high quality level in the dimension. Level 4 demonstrates outstanding quality and can be considered as a model of excellence. It is to be noted that the Telecom Bretagne SAR corresponds to its general engineering programme in three years at Master level and as such covers almost all the spectrum of the institution (and not a one year Master specific to sustainability).

5 ANALYSIS

5.1 Sustain institutional policies and strategies: the label was a mean, not an end in itself

As did Telecom Bretagne in order to better prepare and organize potential S&SR SARs for accreditation and sustain change [15], nominating a quality referent or representative for sustainable development, in contact with all the stakeholders, permits to limit the unorganized and unstructured effects of audit visits. The experiences discussed in this paper should prompt engineering institutions, new to sustainability reporting [7], to regularly collect internal S&SR initiatives and track records. Initiated in 2007 at Telecom Bretagne, the phase of initialization of S&SR is the hardest and longest (including an archaeology phase), but thanks to a clear referential, framework and guidelines for evaluation, and based on a systemic interdisciplinary approach, an identification of factors contributing to sustainability dimensions [16] at institutional level, can be more continuously formalized. On the qualitative aspects, the audit report was used by the audited institution to sustain top-down policies, to diffuse and disseminate good practices through the whole institute. It gives ways to progress on dimensions or clarify strategies. The audits preparation and reporting discussed in this paper now allow the institution to engage in an internal reflection that will contribute to coherently enhance and sustain its strategies, research and educational missions [13], so as to favour national and international recognition of its policies and dynamism in the area of S&SR.

5.2 Staff cost evaluation

The participation of pilot institutions in QUESTE-SI was mainly covered by the EU funding. Apart from the costs of the awarding body committee which controls consistent scoring and recommendations for all evaluated institutions, it is now possible, thanks to the above-mentioned experiences, to clarify staff costs to be covered. Excluding the full archaeology phase, Table 1 synthesis these data for institutions willing to engage in a specific sustainability labelling (SAR, audit, and awarding), in a context where a representative for sustainable development or quality assurance manager is in place. The SAR was mainly filled by the two quality referents (one Manager and one Associate Professor). Costs are minimal as they do not cover side reporting or full proof reading of the SAR by internal stakeholders, nor slides preparation for the audit visit. They are cumulative, e.g. a 1,5 days as student staff cost corresponds to one hour of presence in the audit for a dozen students. It is to be noted that, as proposed for accreditations of HEIs, fees are most often required for the accreditation organization.

Table 1. Day staff costs for a QUESTE-SI SAR preparation and audit.

	Manager	Researcher/Prof	Technician	Administrative	Student	**Total**
1 Auditor	4			0,5		**4,5**
Institution, SAR	8	7	1	1		**17**
Institution, audit	3	3	1	1	1,5	**9,5**

5.3 Resistance to changes

Nowadays, HEIs are more and more requested to meet quality standards. For this reason, “an increasing number of institutions have to implement reforms and to juggle with a plethora of recommendations and rule books defined by national or international accreditation or evaluation bodies. But, as the leadership is rather light in some institutions, it is a complex management challenge which has to overcome possible conflicting and restraining forces and face resistance to changes” [11]. In the same way, promoting sustainable education in the field of technical and engineering education can also be subject to inertia due to disciplinary silos, both at institutional, faculty, staff, or student levels. At the strategic and policy-making levels, active and formalized views of S&SR [10] are still not a natural trend in many institutions. Even if teacher and researcher individual initiatives, or specialized Masters in the topic, are often promoted, quality assurance processes are more than welcome to move to a more global perspective and cross disciplinary approach, integrating S&SR in curricula [13], campuses, and institution strategies and vision. Based on experienced reporting and evaluations, both from an audited HEI (via its quality referents) and auditor perspectives, the quantitative and quantitative results drawn in the paper could give first hints to anticipate an alignment with the EU and national S&SR issues for HEIs via accreditations of evaluation agencies.

6 PERSPECTIVES

On the engineering and managing side, to support the (re)mobilization of the sustainability dimensions in the context of risks of loss of impetus, specific evaluation systems such as QUESTE-SI permit to enhance progress strategy in an integrative view, alongside with other continuous improvement models (e.g. national accreditation, CDIO standard 12). Such systems support the implementation of the logic of proof in a structured manner. Even if the communication side is clearly not to be neglected, both internally to keep the flame and externally for accountability,

evaluation systems should be adapted to limit resistance to changes as proposed in the following subsections.

6.1 Cross or pair-evaluations

Self-evaluation, conducted internally but scored externally, is not so often objective. Due to a lack of detachment and for accountability purposes, an institution may blur its own weaknesses and tend to mask some problems. The non ranking objective of the QUESTE-SI referential would facilitate good practises exchanges among evaluated institutes. S&SR evaluations could be fruitfully conducted horizontally by groups external to the institutional unit, but belonging to a similar type of HEI. This approach [17] would be beneficial for both the institution evaluated, which would get a more objective view on its strengths and weaknesses, and for the collaborator evaluation team, which would be able to identify best practices possibly useful for its own institution. For experience sharing, in a tense context of resources diminution, less formal cross-evaluations with sparring partners, as a complement to formal accreditations, should permit to more deeply promote S&SR and sustainable engineering education within the HEIs arena.

6.2 Implicate students as key actors in the change process

From a consumer viewpoint, students benefit from evaluation or ranking systems, as they facilitate the identification of the most advanced institutions. But full external evaluations have also some biases in terms of reliability and fairness, they are less oriented towards continuous improvement. However, students are very good stakeholders in the quality process to answer questions relating to their learning experience or campus, as well as to manage interviews to prepare SAR. Moreover, as present and future actors in S&SR for the industry and society, they can strongly influence (voice) educational systems via a bottom-up approach as producers or stimulators of change. As experienced in [18], why not involving students in the self-evaluation process and quality assurance loop as quality managers? What are the benefits of students as key actors in the change process for sustainability issues?

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